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BEAVER RUN RESERVOIR WESTMORELAND COUNTY, PENNSYLVANIA

Pacific Northwest Environmental
Research Laboratory

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June 1975

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT
ON
BEAVER RUN RESERVOIR
WESTMORELAND COUNTY
PENNSYLVANIA
EPA REGION III
WORKING PAPER No. 413

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NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

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REPORT
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WITH THE COOPERATION OF THE

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

AND THE

PENNSYLVANIA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Pennsylvania Department of Environmental Resources for professional involvement and to the Pennsylvania National Guard for conducting the tributary sampling phase of the Survey.

Walter A. Lyon, Director of the Bureau of Water Quality Management, Richard M. Boardman, Chief of the Division of Water Quality, and James T. Ulanoski, Aquatic Biologist of the Division of Water Quality, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

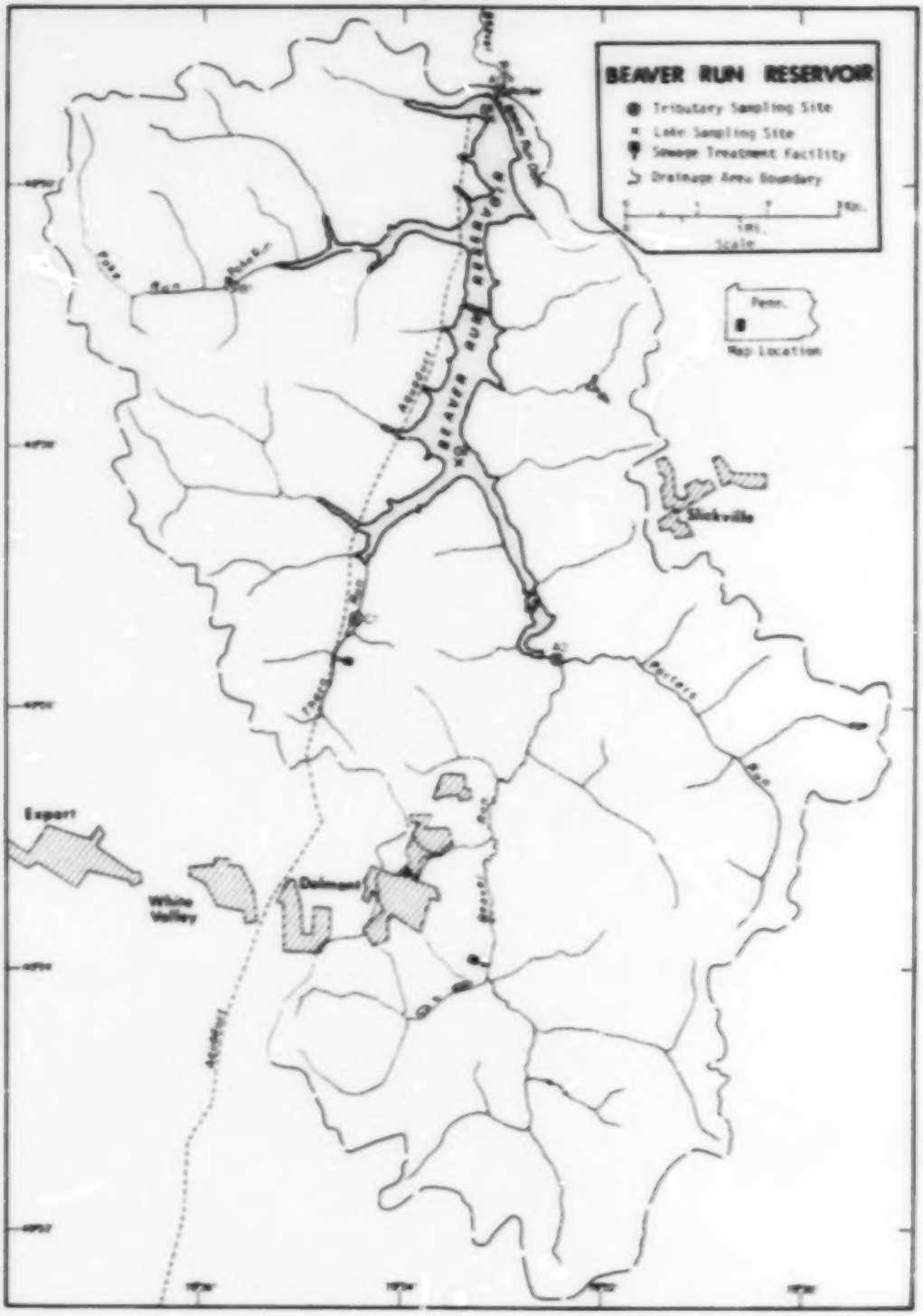
Major General Harry J. Mier, Jr., the Adjutant General of Pennsylvania, and Project Officer Major Ronald E. Wickard, who directed the volunteer efforts of the Pennsylvania National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF PENNSYLVANIA

LAKE NAME	COUNTY
Allegheny Reservoir	McKean, Warren, PA; Cattarugus, NY
Beaver Run Reservoir	Westmoreland
Beltzville	Carbon
Blanchard Reservoir	Centre
Canadohta	Crawford
Conneaut	Crawford
Conewago (Pinchot)	York
Greenlane	Montgomery
Harveys	Luzerne
Indian	Somerset
Naomi	Monroe
Ontelaunee	Berks
Pocono	Monroe
Pymatuning Reservoir	Crawford, PA; Ashtabula, OH
Shenango River Reservoir	Mercer
Stillwater	Monroe
Wallenpaupack	Pike, Wayne


BEAVER RUN RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Penn.
Map Location
Slickville
Export
White Valley
Delmont

BEAVER RUN RESERVOIR

STORET NO. 4219

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Beaver Run Reservoir is mesotrophic. It ranked ninth in overall trophic quality when the 17 Pennsylvania lakes sampled in 1973 were compared using a combination of six parameters**. One lake had less median total phosphorus, five had less and three had the same median dissolved phosphorus, 13 had less median inorganic nitrogen, two had less mean chlorophyll a, and two had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in July and October, 1973.

Survey limnologists reported some rooted aquatic vegetation in the shoreline shallows near station 1, but no algal concentrations were evident.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Beaver Run Reservoir was phosphorus limited at the time the sample was collected (04/23/73). The lake data indicate phosphorus limitation at the other sampling times as well.

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* Table of metric conversions--Appendix A.
** See Appendix B.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution from known point sources amounted to 7.9% of the total input to Beaver Run Reservoir during the sampling year. The individual sources were the domestic sewage treatment facilities for Gibson Electric, Inc. (4.8%), the Forbes Trail Mobile Home Park (2.9%), and Consolidated Gas Supply Corporation, Oakford Station (0.2%). However, the non-point source phosphorus exports for Beaver Run and Poke Run (see page 14) were significantly higher than Pennsylvania tributaries studied elsewhere (e.g., the mean phosphorus export of six unimpacted tributaries of Shenango River Reservoir* was 15 kg/km^2/yr--range 3-36 kg/km^2/yr). It is likely that unidentified point sources (e.g., sewage effluents from Delmont) contributed significantly to the nutrient loads to Beaver Run Reservoir.

The present Beaver Run Reservoir phosphorus loading rate of 1.70 g/m^2/yr is nearly two times the rate proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 14). For this reason, all phosphorus inputs should be minimized to the greatest practicable extent to protect the existing trophic condition of Beaver Run Reservoir.

2. Non-point sources--The mean annual phosphorus load from non-point sources, including precipitation, accounted for 92.1%

* Working Paper No. 426.

of the total reaching Beaver Run Reservoir. Beaver Run (67.1%) and Poke Run (14.8%) were the principal contributors. As discussed above, part of the phosphorus loads remaining after accounting for the known point-source loads probably is attributable to point sources rather than to non-point source contributions. The high phosphorus export rates of Beaver Run (105 $kg/km^2/yr$) and Poke Run (140 $kg/km^2/yr$) may have resulted from underestimation of the contributions of the known point sources or to unidentified point sources in the drainage basin. The contribution of the ungaged tributaries is estimated to have been 9.2% of the total phospnorus input to Beaver Run Reservoir.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 4.55 kilometers^2.
2. Mean depth: 7.3 meters.
3. Maximum depth: 18.3 meters.
4. Volume: 33.215 x 10^6 m^3.
5. Mean hydraulic retention time: 110 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Beaver Run	49.5	1.4
Poke Run	8.2	0.5
Minor tributaries & immediate drainage -	48.3	1.6
Totals	106.0	3.5

2. Outlet -

Beaver Run	110.6**	2.3
Westmoreland Aqueduct	-	1.2
Totals	110.6	3.5

C. Precipitation***:

1. Year of sampling: 102.6 centimeters.
2. Mean annual: 114.3 centimeters.

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† Ulanoski, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake; outflow adjusted to equal sum of inflows (see page 10).
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Beaver Run Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 16.8 meters at station 1 and 8.5 meters at station 2.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR BEAVER RUN RESERVOIR
STREET CODE 0217

PARAMETER	1st SAMPLING (02/23/73) 2 SITES RANGE	MEAN	MEDIAN	2nd SAMPLING (02/28/73) 2 SITES RANGE	MEAN	MEDIAN	3rd SAMPLING (03/ 5/73) 2 SITES RANGE	MEAN	MEDIAN
TEMP (C)	8.0 - 14.7	11.4	11.5	16.9 - 21.2	21.2	25.0	13.0 - 21.5	19.5	22.0
DISS OXY (MG/L)	10.0 - 11.0	10.9	10.8	0.5 - 9.3	5.3	7.9	0.2 - 8.5	5.7	7.0
CONDUCTVY (MICROMHO)	255. - 308.	279.	286.	189. - 339.	264.	263.	229. - 279.	248.	237.
PH (STAND UNITS)	6.8 - 7.0	7.0	7.1	6.2 - 7.5	6.8	6.5	6.5 - 7.1	6.9	7.0
TOT ALK (MG/L)	12. - 15.	13.	13.	14. - 31.	19.	18.	12. - 38.	22.	22.
TOT P (MG/L)	0.006 - 0.009	0.007	0.007	0.008 - 0.015	0.010	0.009	0.004 - 0.020	0.012	0.011
ORTHO P (MG/L)	0.004 - 0.007	0.005	0.005	0.005 - 0.011	0.008	0.005	0.007 - 0.014	0.009	0.009
NO2+NO3 (MG/L)	0.400 - 1.100	0.700	0.710	0.300 - 0.750	0.540	0.600	0.000 - 0.780	0.510	0.500
AMMONIA (MG/L)	0.050 - 0.080	0.067	0.070	0.030 - 0.510	0.185	0.080	0.050 - 0.370	0.120	0.095
ORG N (MG/L)	0.200 - 0.400	0.255	0.200	0.200 - 0.700	0.300	0.200	0.200 - 0.500	0.337	0.300
INORG N (MG/L)	0.550 - 1.100	1.067	0.970	0.650 - 0.950	0.785	0.700	0.550 - 0.800	0.630	0.575
TOTAL N (MG/L)	1.100 - 1.400	1.230	1.200	0.950 - 1.150	0.969	0.920	0.700 - 1.000	0.867	0.900
CHLOROPH A (MG/L)	1.7 - 3.0	2.3	2.3	2.1 - 17.0	9.8	9.8	2.8 - 3.9	3.3	3.3
SECCHI (METERS)	2.1 - 6.5	3.4	3.4	2.5 - 2.6	2.7	2.7	2.7 - 2.8	2.8	2.8

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/23/73	1. Flagellates	101
	2. Dinobryon	74
	3. Coscinodiscus	46
	4. Tabellaria	18
	5. Cryptomonas	18
	Other genera	45
	Total	302
07/28/73	1. Dinobryon	487
	2. Cyclotella	252
	3. Ceratium	50
	4. Green filament	17
	5. Flagellates	17
	Total	823
10/05/73	1. Dinobryon	686
	2. Flagellates	281
	3. Cryptomonas	62
	4. Melosira	51
	5. Cyclotella	31
	Other genera	22
	Total	1,133

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
04/23/73	01	3.0
	02	1.7
07/28/73	01	2.1
	02	17.6
10/05/73	01	2.8
	02	3.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	<0.005	1.035	0.1
0.050 P	0.055	1.035	13.6
0.050 P + 1.0 N	0.055	2.035	13.8
1.0 N	<0.005	2.035	0.1

2. Discussion -

The control yield of the assay alga, *Selenastrum capricornutum*, indicates that the potential primary productivity of Beaver Run Reservoir was low at the time the sample was collected. A significant increase in yield occurred with the addition of orthophosphorus alone, but the addition of only nitrogen did not result in an increase in yield as compared to the control; therefore, phosphorus limitation is indicated.

The lake data further indicate phosphorus limitation. At all sampling times, the mean inorganic nitrogen to orthophosphorus ratios were 76 to 1 or greater.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Pennsylvania National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of March when two samples were collected. Sampling was begun in May, 1973, and was completed in March, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Pennsylvania District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

Westmoreland County withdraws an average of 1.2 m^3/sec for municipal water needs via an aqueduct with the intake located near the outlet sampling station A-1 (Harner, 1973). Outlet nutrient loads were estimated using the withdrawal flow plus the outlet flow and the means of the nutrient levels measured at the outlet.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the

* See Working Paper No. 175.

nutrient loads, in kg/km^2/year, at stations C-1, D-1, E-1, F-1, G-1, and H-1 of Shenango River Reservoir (Working Paper No. 426) and multiplying the means by the ZZ area in km^2.

The operators of the Consolidated Gas Supply Corp. (Oakford Station) and Gibson Electric, Inc. wastewater treatment plants provided monthly effluent samples and corresponding flow data. The operator of the Forbes Trail Mobile Home Park treatment plant did not participate in the Survey, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known muncipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Oakford Station	55	trickling filter	7.1	Beaver Run
Gibson Elec.	48	act. sludge	3,679.4	Unnamed trib./ Beaver Run
Forbes Trail Mobile Home Park	200*	ext. aer.	75.7**	Thorn Run

2. Known industrial - None

† Treatment plant questionnaires.
* Estimated 2 persons per mobile home.
** Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Beaver Run	5,205	67.1
Poke Run	1,145	14.8
b. Minor tributaries & immediate drainage (non-point load) -	710	9.2
c. Known municipal STP's -		
Oakford Station	15	0.2
Gibson Electric	370	4.8
Forbes Trail Mobile Home Park	225	2.9
d. Septic tanks* -	5	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	80	1.0
Total	7,755	100.0

2. Outputs -

Lake outlet - Beaver Run and Westmoreland Aqueduct	1,325

3. Net annual P accumulation - 6,430 kg.

* Estimate based on 4 shoreline dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Beaver Run	107,995	66.6
Poke Run	28,065	17.3
b. Minor tributaries & immediate drainage (non-point load) -	15,570	9.6
c. Known municipal STP's -		
Oakford Station	70	<0.1
Gibson Electric	4,890	3.0
Forbes Trail Mobile Home Park	680	0.4
d. Septic tanks* -	45	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	4,910	3.0
Total	162,225	100.0

2. Outputs -

Lake outlet - Beaver Run and Westmoreland Aqueduct	89,850

3. Net annual N accumulation - 72,375 kg.

* Estimate based on 4 shoreline dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Beaver Run	105	2,182
Poke Run	140	3,423

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	1.70	1.41	35.6	15.9

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Beaver Run Reservoir:

"Dangerous" (eutrophic rate)	0.94
"Permissible" (oligotrophic rate)	0.47

V. LITERATURE REVIEWED

Harner, Robert E., 1973. Personal communication (water withdrawn via Westmoreland Aqueduct). Municipal Auth. of Westmoreland County.

Ulanoski, James, 1975. Personal communication (lake morphometry). PA Dept. Env. Resources, Harrisburg.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	SQR MEAN SEC	MEAN CHLPHA	15= MIN DO	MEDIAN DISS P	INDEX NO
3041	ALLEGHENY RESERVOIR	56 (9)	38 (6)	63 (10)	100 (16)	69 (11)	50 (8)	385
4201	BLANCHARD RESERVOIR	13 (2)	13 (2)	25 (4)	31 (5)	3 (0)	0 (0)	85
4204	CONNEAUT LAKE	44 (7)	63 (10)	69 (11)	56 (9)	34 (5)	41 (6)	307
4207	GREENLANE DAM	6 (1)	6 (1)	19 (3)	13 (2)	3 (0)	6 (1)	53
4213	PYMATUNING RESERVOIR	0 (0)	72 (11)	6 (1)	0 (0)	100 (16)	28 (4)	206
4216	SHENANGO RIVER RESERVOIR	19 (3)	44 (7)	13 (2)	6 (1)	47 (7)	28 (4)	157
4219	BEAVER RUN RESERVOIR	94 (15)	19 (3)	88 (14)	81 (13)	19 (2)	59 (8)	360
4226	BELTZVILLE DAM	88 (14)	25 (4)	94 (15)	94 (15)	34 (5)	88 (13)	423
4221	CANADOHTA LAKE	50 (8)	97 (15)	56 (9)	19 (3)	59 (9)	88 (13)	369
4222	HARVEY'S LAKE	63 (10)	81 (13)	100 (16)	63 (10)	47 (7)	59 (8)	413
4223	INDIAN LAKE	100 (16)	31 (5)	75 (12)	75 (12)	19 (2)	88 (13)	388
4224	LAKE NAOMI	81 (13)	88 (14)	44 (7)	69 (11)	88 (14)	75 (12)	445
4225	ONTELAUNEE DAM	25 (4)	0 (0)	0 (0)	44 (7)	19 (2)	13 (2)	101
4226	PINCHOT LAKE	31 (5)	56 (9)	31 (5)	38 (6)	81 (13)	19 (3)	256
4227	POCONO LAKE	38 (6)	97 (15)	50 (8)	88 (14)	75 (12)	41 (6)	389
4228	STILLWATER LAKE	72 (11)	72 (11)	38 (6)	25 (4)	94 (15)	100 (16)	401
4229	LAKE WALLENPAUPACK	72 (11)	50 (8)	81 (13)	50 (8)	59 (9)	59 (8)	371

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P
3641	ALLEGHENY RESERVOIR	0.016	0.380	414.250	3.700	13.800	0.006
4201	BLANCHARD RESERVOIR	0.064	1.300	453.143	15.187	14.900	0.046
4204	CONNEAUT LAKE	0.023	0.185	402.000	7.567	14.600	0.007
4207	GREENLANE DAM	0.066	1.475	460.222	24.011	14.900	0.020
4213	PYMATUNING RESERVOIR	0.070	0.120	467.750	56.333	7.700	0.008
4216	SHENANGO RIVER RESERVOIR	0.058	0.340	463.555	26.800	14.500	0.008
4219	BEAVER RUN RESERVOIR	0.009	0.835	384.833	5.183	14.800	0.006
4220	BELTZVILLE DAM	0.010	0.815	362.444	4.856	14.600	0.005
4221	CANADOHTA LAKE	0.020	0.130	436.000	19.167	14.100	0.005
4222	HARVEY'S LAKE	0.015	0.160	338.000	5.967	14.500	0.006
4223	INDIAN LAKE	0.009	0.520	400.222	5.211	14.800	0.005
4224	LAKE NAOMI	0.014	0.135	443.333	5.533	8.000	0.005
4225	ONTELAUNEE DAM	0.040	2.150	470.667	11.783	14.800	0.011
4226	PINCHOT LAKE	0.027	0.245	453.000	13.950	11.500	0.008
4227	POCONO LAKE	0.024	0.130	438.800	4.980	13.200	0.007
4228	STILLWATER LAKE	0.015	0.180	449.000	18.233	7.900	0.004
4229	LAKE WALLENPAUPACK	0.015	0.250	394.583	9.617	14.100	0.006

TRIBUTARY FLOW INFORMATION FOR PENNSYLVANIA 1/27/75

LAKE CODE 4219 BEAVER RUN RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
421981	5	73	0.57	19	0.59				
	6	73	0.05	23	0.02				
	7	73	0.01	21	0.10				
	8	73	0.00	18	0.00				
	9	73	0.04	16	0.0				
	10	73	0.02	20	0.02				
	11	73	0.22	17	0.0				
	12	73	1.22	17	0.37				
	1	74	0.71	19	0.21				
	2	74	0.31	9	0.45				
	3	74	0.88	16	4.81				
	4	74	0.24	19	3.07				
421922	5	73	1.56	19	0.45				
	6	73	0.24	23	0.14				
	7	73	0.68	21	0.51				
	8	73	0.03	18	0.02				
	9	73	0.25	16	0.01				
	10	73	0.16	20	0.14				
	11	73	0.43	17	0.0				
	12	73	3.43	17	1.39				
	1	74	2.21	19	16.25				
	2	74	1.22	9	1.59				
	3	74	2.72	16	10.39				
	4	74	0.46	19	0.37				

12

APPENDIX D

PHYSICAL and CHEMICAL DATA

DATE	TIME	DEPTH	OXYGEN, DISSOLVED	OXYGEN, DISSOLVED PERCENT OF SAT.	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL)	OXYGEN DEMAND, BIOCHEMICAL, 5 DAY	SOLIDS, RESIDUE ON EVAPORATION AT 180 C	SOLIDS, RESIDUE AT 105 C, SUSPENDED	SOLIDS, VOLATILE (IGNITION LOSS)	SOLIDS, VOLATILE (IGNITION LOSS) SUSPENDED	SOLIDS, VOLATILE (IGNITION LOSS) DISSOLVED	SOLIDS, VOLATILE (IGNITION LOSS) PERCENT VOLATILE
FEB		FEET	MG/L		MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L P
23/0957	15	30	10.3		106	255	0.051	13	0.050	0.000	0.010	0.007
	15	35	10.4	11.2		250	0.042	13	0.060	0.000	0.010	0.005
	15	38	10.5	11.3		250	7.150	13	0.050	0.000	0.000	0.005
	15	39	10.3	11.0		250	7.049	13	0.070	0.000	0.000	0.005
	15	38	10.5	11.3		250	7.095	12	0.050	0.000	0.000	0.005
23/1022	15	30	10.6	11.4	110	250	7.052	15	0.050	0.000	0.070	0.008
	15	30	10.5	11.3		247						
	15	30	10.5	11.3		247						
	15	30	10.3	11.0		255	7.091	14	0.000	0.000	0.000	0.000
	15	30	10.2	10.9		253	7.136	13	0.030	0.000	0.000	0.000
	15	30	10.2	10.9		259	7.025	13	0.030	0.000	0.030	0.005
	15	30	10.1	10.8		253	6.930	16	0.000	0.000	0.750	0.000
	15	30	10.0	10.7		249						
	15	30	10.0	10.7		250	6.950	23	0.130	0.300	0.020	0.005
	15	30	9.9	10.6		250						
	15	30	9.9	10.6		250	6.950	31	0.010	0.700	0.300	0.005
23/1057	15	30	9.8	10.5	100	238	7.031	12	0.050	0.300	0.500	0.004
	15	30	9.8	10.5		238	7.012	14	0.050	0.200	0.500	0.007
	15	30	9.8	10.5		231	7.000	15	0.000	0.200	0.520	0.007
	15	30	9.8	10.5		226	6.930	20	0.100	0.100	0.700	0.009
	15	30	9.8	10.5		225	6.801	35	0.170	0.500	0.000	0.008

DATE	TIME	DEPTH	NITROGEN, NITRITE TOTAL	NITROGEN, AMMONIA TOTAL
FEB		FEET	MG/L P	MG/L
23/0957	15	30	0.001	
	15	35	0.001	
	15	38	0.000	
	15	39	0.000	
	15	38	0.001	
23/1022	15	30	0.001	0.1
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
23/1057	15	30	0.000	0.1
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	
	15	30	0.000	

< VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 73/03/27

02192
40 28 00.0 079 33 35.0
BEAVER RUN RESERVOIR
42129 PENNSYLVANIA

FILTERED
J

21112UZ
0030 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/23	16	15 0000	14.7		80	290	7.00	14	0.080	0.300	1.100	0.007
	16	15 0004	14.3	12.8		300	7.00	15	0.070	0.300	1.100	0.004
	16	15 0015	11.6	12.5		300	7.00	15	0.070	0.200K	1.000	0.005
	16	15 0020	9.4	10.6		305	7.00	13	0.080	0.300	1.100	0.007
73/07/20	15	55 0000	20.9	7.9	100	309	7.50	19	0.060	0.500	0.650	0.011
	15	55 0005	20.9			308						
	15	55 0010	20.3			306						
	15	55 0014	20.0	7.0		308	6.90	22	0.110	0.200	0.690	0.005
	15	55 0020	19.3	6.8		262	6.20	21	0.100	0.200	0.710	0.005
	15	55 0025	15.4			261						
	15	55 0027	14.0	9.2		262	6.20	18	0.090	0.300	0.660	0.005
73/10/05	16	00 0000	21.0		100	279	7.00	23	0.100	0.500	0.470	0.011
	16	00 0005	21.0	8.0		279	7.00	23	0.090	0.300	0.470	0.008
	16	00 0020	20.1	7.0		279	7.10	26	0.120	0.400	0.480	0.010

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHL-PHYL A UG/L
73/06/23	16	15 0000	0.009	1.7
	16	15 0004	0.006	
	16	15 0015	0.007	
	16	15 0020	0.009	
73/07/20	15	55 0000	0.010	17.0
	15	55 0010	0.013	
	15	55 0020	0.011	
	15	55 0027	0.011	
73/10/05	16	00 0000	0.012	3.9
	16	00 0005	0.012	
	16	00 0020	0.020	

A VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/02/03

421VA1
40 30 48.0 079 33 05.0
BEAVER RUN
42085 7.5 VANDERGRIFT
O/BEAVER RUN RES
MAY 380 BRDG JUST BELO BEAVER RUN DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	17 18		0.880		0.200	0.007	0.010
73/06/11	20 40		0.840	1.980	0.200	0.005K	0.010
73/07/17	20 00		0.720	1.470	0.215	0.005K	0.010
73/09/16	11 00		0.510	0.440	0.220	0.005K	0.010
73/10/20	15 45		0.360	0.650	0.280	0.005K	0.025
73/11/17	12 00		0.504	0.700	0.068	0.005K	0.010
73/12/23	14 15		0.526	1.200	0.084	0.005K	0.010
74/01/26	16 30		0.660	0.300	0.060	0.005K	0.010
74/02/17	14 30		0.792	0.200	0.030	0.005	0.020
74/03/02	08 50		0.870	1.000	0.050	0.005	0.010
74/03/16	14 30		0.790	0.200	0.035	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

4219A2
40 26 28.0 079 32 43.0
BEAVER RUN
42 7.5 SLICKVILLE
1/BEAVER RUN RES
BANK BELO CONFLU OF BEAVER & PORTERS RUN
11EPALES 2111704
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	17 45		0.940	1.540	0.061	0.007	0.035
73/06/11	20 15		0.660	1.980	0.231	0.012	0.065
73/07/20	19 30		0.058	2.600	1.060	0.005K	0.120
73/08/16	20 00		0.013	1.150	1.900	0.024	0.350
73/09/16	16 15		0.530	1.300	0.130	0.058	0.110
73/10/20	14 00		0.480	0.400	0.043	0.036	0.095
73/11/17	12 15		0.920	2.200	0.140	0.005K	0.025
73/12/23	14 45		1.000	0.800	0.072	0.005K	0.035
74/02/17	13 25		1.260	1.800	0.070	0.020	0.345
74/03/02	10 45		1.340	1.800	0.065	0.020	0.375
74/03/16	14 30		1.260	1.700	0.055	0.015	0.345

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

421981
40 24 20.0 079 35 47.0
POKE RUN
42 7.5 SLICKVILLE
T/BEAVER RUN RES
SEC RD BRDG IN TOWN OF POKE RUN
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	16 40		0.460	0.260	0.110	0.040	0.085
73/06/11	20 53		0.490	2.200	0.280	0.115	0.175
73/07/18	21 00		0.520	0.520	0.086	0.065	0.130
73/08/14	08 25		0.630	0.280	0.170	0.005	0.010
	20 35		0.710	2.600	0.710	0.200	0.345
73/09/16	10 30		0.330	0.390	0.147	0.138	0.180
73/10/20	15 30		0.130	0.750	0.270	0.140	0.270
73/11/17	11 45		1.010	1.500	0.088	0.012	0.045
73/12/21	14 30		0.890	0.200	0.040	0.012	0.035
74/01/26	15 00		0.880	0.700	0.050	0.010	0.040
74/02/17	15 25		0.870	0.780	0.060	0.015	0.095
74/03/02	09 25		0.960	1.900	0.070	0.015	0.090
74/03/16	12 00		1.040	0.400	0.185	0.010	0.095

STONET RETRIEVAL DATE 75/02/03

4219C1
40 26 25.0 079 34 40.0
THORN RUN
42 7.5 SLICKVILLE
T/BEAVER RUN RES
30 FT BELO MINE TREATMENT FACILITY
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/14	18 26		0.154	4.200	2.000	0.042	0.160
73/06/11	21 05		0.147	4.700	1.900	0.005K	0.020
73/07/20	21 30		0.176	5.900	2.300	0.005K	0.087
73/08/16	08 50		0.670	8.200	3.600	0.015	0.145
73/09/16	10 00		0.058	11.000	5.700	0.005K	0.120
73/10/20	15 00		0.310	7.000	7.000	0.042	0.280
73/11/17	11 30		0.840	2.100	1.700	0.012	0.185
73/12/23	14 00		0.580	1.600	0.750	0.005K	0.090
74/01/26	13 05		0.490	2.100	1.900	0.017	0.400
74/02/17	13 00		0.792	1.900	1.400	0.010	0.200
74/03/02	10 15		0.840	2.500	1.450	0.005	0.210
74/03/16	13 35		0.810	2.200	1.570	0.005K	0.195

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/02/03

421YAA IP421YAA P000055
40 24 13.0 079 33 34.0
OAKFORD STATION (DELMONT)
42045 7.5 SLICKVILLE
1/BEAVER RUN RESERVOIR
BEAVER RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50050 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/20	09 00		32.000	0.590	0.165	4.400	4.500	0.001	
73/09/07	09 00				0.980	6.320	6.600		
73/10/17	08 30		37.000	7.800	6.400	5.400	5.400		
73/11/19	09 00		36.000	1.120	0.280	3.300	3.350	0.002	0.002
73/12/28	09 00		12.000	2.530	0.230	2.400	2.600	0.002	
74/01/18	09 30		30.000	17.000	2.300	3.800	4.400	0.002	
74/02/20	09 30		20.000	7.000	0.870	6.700	6.700	0.002	
74/03/19	08 30		18.000	4.000	0.387	4.600	5.350	0.002	
74/04/17	09 30		20.400	2.300	0.064	5.000	5.500	0.002	
74/05/15	10 00		<3.000	1.000K	0.200	3.900	4.100	0.002	
74/06/25	09 00		<3.000	1.400	0.050K	2.700	2.900	0.002	
74/07/15	09 10		11.000	1.000K	0.220	3.600	3.750	0.002	
74/08/20	10 00		21.000	1.500	0.050K	0.089	5.200	0.002	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/02/04

421948 AS=421948 P000048
40 24 51.0 079 24 13.0
WINDOW ELECTRIC INC (DELMONT)
42 7.5 SLICKVILLE
T/HEAVEN RUN RESERVOIR
UNNAMED STREAM/HEAVEN RUN
ALLEGHENY 2141204
0 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS (ORTHO) MG/L P	00665 PHOS-TOT MG/L P	50050 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/24	11 00								
CP(T)-			0.690	2.750	0.350	0.130	0.260	1.000	1.000
73/07/24	16 00								
73/08/22	10 00								
CP(T)-			0.810	3.100	0.770	0.260		1.000	
73/08/22	15 00								
73/10/24	10 00								
CP(T)-			1.200	3.700	0.043	0.320	0.300	1.000	
73/10/24	15 00								
73/11/30	10 00								
CP(T)-			1.300		0.048K	0.350	0.390	1.000	1.000
73/11/30	15 00								
73/12/20	10 00								
CP(T)-			1.600	2.600	0.330	0.140	0.200	1.000	1.000
73/12/20	15 00								
74/01/24	10 00								
CP(T)-			1.700	2.700	0.450	0.110	0.140	0.720	0.720
74/01/24	15 00								
74/02/12	10 00								
CP(T)-			1.840	1.400	0.470	0.145	0.250	1.000	1.000
74/02/12	15 00								
74/04/11	10 00								
CP(T)-			1.500	1.000K		0.100	0.120	1.000	1.000
74/04/11	14 00								
74/05/10	10 00								
CP(T)-			1.520	3.500	0.170	0.260	0.320	1.000	1.000
74/05/10	15 00								
74/06/10	10 00								
CP(T)-			1.200	1.500	0.340	0.230	0.230	1.000	1.000
74/06/10	15 00								
74/07/25	10 00								
CP(T)-			0.920	1.000	0.185	0.100	0.220	1.000	1.000
74/07/25	15 00								
74/08/19	09 30								
CP(T)-			0.880	1.900	0.510	0.050K	0.150		
74/08/19	14 30								

K VALUE KNOWN TO BE LESS THAN INDICATED

12